Mathematics 3790H – Analysis I: Introduction to analysis
TRENT UNIVERSITY, Winter 2012

Assignment #8
Find the sum!
Due on Thursday, 15 March, 2012.

First, consider the series $\displaystyle\sum_{n=1}^{\infty} \frac{1}{n(n+1)} = \frac{1}{2} + \frac{1}{6} + \frac{1}{12} + \frac{1}{20} + \frac{1}{30} + \frac{1}{42} + \cdots$.

1. Show that $\displaystyle\sum_{n=1}^{\infty} \frac{1}{n(n+1)}$ converges. *[1]*

2. Compute $\displaystyle\sum_{n=1}^{\infty} \frac{1}{n(n+1)}$. *[4]*

Second, consider the series $\displaystyle\sum_{n=1}^{\infty} \frac{(-1)^{n+1}}{n(n+1)} = \frac{1}{2} - \frac{1}{6} + \frac{1}{12} - \frac{1}{20} + \frac{1}{30} - \frac{1}{42} + \cdots$.

3. Show that $\displaystyle\sum_{n=1}^{\infty} \frac{(-1)^{n+1}}{n(n+1)}$ converges. *[1]*

4. Compute $\displaystyle\sum_{n=1}^{\infty} \frac{(-1)^{n+1}}{n(n+1)}$. *[4]*